haus demonstrated his new, but already widely adopted, fall apparatus for the control of chronoscopes and other time-measuring instruments (for full description, see *Zeitschr. f. Psychologie*, xxx., 292). Several other apparatus were exhibited, but unfortunately not in such rich variety as at Giessen.

The other papers were those of Jerusalem (Vienna), on remembering and forgetting; Witasek (Gratz), on the methodics of measuring memory; Pfeiffer (Würzburg), on a method of determining qualitative types in school-work; Lipmann (Berlin), on the effect of suggestive questions; Asher (Bern), on the law of the specific energies of the senses; Detlessen (Wismar), on colour-values and colour-measurement; Hughes (Soden), on single affective states; Schultze (Würzburg), on accentual effects (Wirkungsakzente); Decroly (Brussels), on anthropometrical and psychological tests for children; v. Aster (Munich), on the third dimension of the spatial presentation (visual); and Kobylecki (Cracow), on psychological experiment without introspection.

On the whole, the congress showed itself strongly influenced by the universal and increasing reaction against the materialistic atomism of the early days of experimental psychology. The admission is ever gaining ground, that consciousness is something more than a mechanically changing conglomeration of sensations and feelings in varying quality, intensity and complication.

The earnest scientific tone and strict attention to business which had so favourably distinguished the Giessen congress from the international ones was on the present occasion even more marked. The members allowed themselves no relaxation until after the close of the proceedings, when a general picnic was made to the beautiful Veitshöchheim "Pleasure Palace" of the former Prince-Bishops. The next congress will be held at Frankfort (on the Main) on April 22–25, 1908. C. SPEARMAN.

THE MILAN INTERNATIONAL EXHIBITION.

THE Milan exhibition, which was opened in state by the King and Queen of Italy on April 28, is still far from complete. The reason for its unfinished condition is to be found in the increased scope of the exhibition. As originally planned, it was intended to commemorate the opening of the Simplon Tunnel by confining the exhibition to a display of progress in transport by land and water. Gradually other branches of industry were added, and support has been accorded by the leading European countries, France predominating with an area of 250,000 square feet. Austria follows with 180,000 square feet, Germany with 160,000 square feet, Belgium with 108,000 square feet, Great Britain with 75,000 square feet, and Hungary with 32,000 square feet. The exhibition covers an area of 400 acres, of which more than half is covered by buildings of a decorative character. Italian exhibitors occupy about one-half of the space, and the exhibits afford striking evidence of the remarkable industrial progress that has been made in Italy of late years. Altogether the exhibition is exceptionally attractive from a popular and a business point of view, whilst from a technical point of view its chief interest is due to the fact that it is the first international exhibition in which electricity has been used for driving the machinery shown in operation.

Of the exhibits of scientific interest, the most interesting are those of the Italian Admiralty. The methods employed in the preparation of charts and the manufacture of torpedoes are well shown. The retrospective exhibition associated with the transportation section is also of great interest. The early history of navigation and of steam transport is illustrated in an admirable manner. Exhibits of historical interest are contributed by the Board of Education, the Corporation of London, Lloyd's Register, the Institutions of Civil and Mechanical Engineers, and the Iron and Steel Institute.

In the various international sections valuable prizes are offered by the King of Italy. They include 400*l.* for the best exhibit of machinery, 400*l.* for the best type of workman's dwelling, 400*l.* for the best flying machine, 400*l.* for the best motor omnibus, 200*l.* for automatic railway couplings, 200*l.* for the best method of testing high-voltage electric currents, 200*l.* for motor-boats, and 200*l.* for the best motor-plough.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

OXFORD.—The University Alembic Club celebrated its hundredth meeting on Saturday, April 28, by holding a dinner in the banqueting room of the Town Hall. The professor of chemistry, the Lee reader, and the Aldrichian demonstrator were present. All the past-presidents of the club and a number of old members attended.

The 283rd meeting of the Junior Scientific Club was held on Friday, May 4, when papers were read on "Bubbles and Emulsions," by Dr. W. Ramsden, and "Who were the Greeks?" by Mr. J. L. Myres.

CAMBRIDGE.—The council of the Senate has nominated Prof. Woodhead, Mr. A. Sedgwick, and Mr. A. E. Shipley, and the special board for biology and geology has nominated Prof. Langley, Mr. J. J. Lister, and Mr. F. F. Blackman, to be members of the board of managers of the Quick fund. The election to the Quick professorship of protozoology rests with the board of managers, who will also control the expenditure of the income derived from the bequest of the late Frederick James Quick.

Mr. F. G. Hopkins, of Emmanuel College, and Mr. W. M. Fletcher, of Trinity College, have been elected examiners to the Gedge prize in physiology.

It is arranged that the voting on the proposals of the Studies and Examination Syndicate with reference to the doing away with compulsory Greek for mathematical and natural science students will take place on the afternoons of Friday, May 25, and Saturday, May 26.

Prof. Macalister, Prof. Langley, and Dr. Hill have published a time-table of courses in human anatomy, physiology, and histology to be held during the long vacation, beginning on July 4.

In addition to the ordinary classes in general pathology and pharmacology to be given at the New Medical Schools during the long vacation, the series of shorter courses dealing with more advanced work will be repeated this year. These courses are open to medical men and senior students only.

A COURSE of seven lectures on "The Morphology of the Bryophyta" was commenced by Prof. J. B. Farmer, F.R.S., at the Chelsea Physic Garden on Tuesday, May 8. Admission is free by ticket, obtainable on application to the Academic Registrar of the University of London.

A COURSE of eight lectures on the "Structure and Functions of the Central Nervous System," with special reference to the brain stem, will be commenced in the physiology department of University College, London, by Dr. W. Page May, on Wednesday, May 16. The lectures are open to all students of the University of London, also to qualified medical men on presentation of their cards.

THE following benefactions to higher education in the United States are announced in *Science*:—The University of California has received a gift of 20,000*l.* from the widow of the late Judge John H. Boalt. Mr. Andrew Carnegie has offered 8000*l.* to Denison University for a new library building on condition that a like sum is secured elsewhere for the endowment of the library. Through the generosity of Mr. Robert S. Brookings and Mr. Adolphus Busch, the medical department of Washington University (St. Louis) has received a gift of 10,000*l.*

AN earnest and well-informed plea for the provision of more adequate funds for the University of Cambridge is made in the current number of the *Quarterly Review*. Though it is a mistake to suppose that the flow of benefactions to the old universities has ceased entirely, the fact remains that Cambridge has twice appealed, once in 1898 and again in 1904, for help to meet her responsibilities. It is alleged that the demands of science have emptied the University chest, and yet there is a popular belief that the university of Newton and Charles Darwin, of Maxwell and Rayleigh, is still shrouded in mediæval shadow. When it is remembered that the expenditure on buildings devoted to science alone since 1862 must have exceeded 300,000*l.*, and that other great expenses have been incurred in the same direction, it is not difficult to understand that it has been done only with external help, and that unless more

funds are forthcoming due growth and development in the scientific departments are impossible. There certainly appears to be an absence of extravagance. The average annual income of the forty-four professors is not more than 550*l.*, and the average income of university teachers, other than professors, is only 250*l.* a year. The needs of the University, as detailed in the article, are indeed numerous, and the means of satisfying them are at present ludicrously inadequate. As has been done with wearisome iteration in these columns, the article refers to American and German munificence on behalf of higher education, and points out the tempting chance of sensible generosity the needs of Cambridge offer to our men of wealth. The generous provision made for university education in Germany and the United States, the part played by such education in the progress of a modern State, and the need that exists to strengthen our intellectual defences if we are to take a leading position in the struggle toward efficiency, were described by Sir Norman Lockyer in his presidential address to the British Association at Southport in 1903. The warning uttered on that occasion, and the position taken as to the significance of higher education to national progress, have been the means of directing attention to our educational deficiencies, and a beginning has been made to remedy them by increased grants to university colleges. A capital sum of a million and a half sterling would solve all difficulties at Cambridge, but wealthy benefactors tarry, probably because the State has not in the past shown its belief in the value of university education; meanwhile the work of a great university languishes.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, February 15.—"Reciprocal Innervation of Antagonistic Muscles. Ninth Note, Successive Induction." By Prof. C. S. **Sherrington,** F.R.S.

In various reflex reactions inhibition is succeeded by marked exaltation of activity in the arcs inhibited. This after-effect may be figured as a rebound from inhibition.

An example is the following. When a dog in which the spinal cord has been transected in the thoracic region is, the period of shock having passed, supported so that its spine is vertical and its hind limbs hang freely, these latter begin to perform a rhythmic stepping movement.

Suppose this reflex is in regular progress and is being recorded from one knee, *e.g.* right, by a thread passing thence to a pulley and light lever, if then the other thigh (left) be gently supported from behind the knee the record shows that the stepping reflex at once ceases in the right limb. The reflex, on recommencing after this pause, continues as it ceases, that is, its tempo and amplitude are practically the same as before the interruption.

This result contrasts with the following. The reflex can be cut short by a strong squeeze of the tail.

The application of this stimulus to the tail does not in any way interfere mechanically with the stepping movement. Suppose the reflex to be in regular progress and recorded as before, if then the tail stimulus be applied the stepping reflex is almost immediately arrested, and in both limbs. The reflex remains in abeyance while the tail stimulus is continued. On the cessation of the latter the reflex returns, and on its return soon shows indubitable increase in activity as compared with its activity before the inhibitory arrest. The increase is chiefly seen in the amplitude of the movement, but there is also often marked quickening of the tempo of the rhythm. The author has seen the rhythm on some occasions quickened by 30 per cent. The after-increase of the reflex may persist in evidence for many seconds. Its decline is gradual.

The arrest of the stepping reflex by tail inhibition cannot be prolonged indefinitely. The reflex tends to return in spite of the inhibitory stimulation when the latter is long persisted in. It is different when the stepping reflex is arrested by lifting one knee; the reflex does not then tend to break through the arrest, however long the latter be continued. In this form the arrest seems referable simply to cessation of the stimulus which excites the reflex. In tail inhibition the arrest seems referable to a central inhibition, the peripheral stimulus excitatory of the reflex remaining in action all the time.

The after-increase consequent upon inhibition may be conveniently termed "*successive spinal induction,*" the more so as that term directs attention to the likeness between the spinal process and certain visual phenomena commonly designated "induction."

Again, it is easy to evoke reflex extension of the hind limb by stimulation of the skin of the opposite hind limb. With the spinal dog laid on its side (*e.g.* left) and a thread attaching the knee of the slightly flexed right limb to a recording lever, the delivery of a stimulus at a skin-point of the left foot evokes reflex extension at right hip and knee. If this stimulus, at moderate and unchanged intensity, be given at regular intervals, a series of extension reflexes of regular height and duration is obtained. If in the course of such a series the right limb is, during one of the intervals, thrown into strong reflex flexion, the next extension-reflex following on the intercurrent flexion differs from those prior to it in being more ample and more prolonged. Its after-discharge is greatly increased and its latency is sometimes diminished. If the test stimulus for the extension-reflex be adjusted at just subliminal value, the intercurrent flexion-reflex will make it supraliminal. The exaltation of the extension-reflex may remain perceptible for five minutes.

Successive spinal induction seems to be a process qualified to play a part in linking together simpler reflexes so as to form from them reflex cycles of action. It appears especially fitted to combine the successive opposite phases of such cyclic reflexes as have been termed "alternating," and shown to be particularly characteristic of the locomotor activity of the mammalian spinal cord. If a reflex, A, not only temporarily inhibits the action of an antagonistic reflex, B, but also as an immediately subsequent result induces in arc of B a phase of superactivity, the central organ is in that way predisposed for a second reflex opposite to A to occur in immediate succession to A itself. Such an effect seems proved by the observations in this and a preceding communication.

"On the Existence of Cell Communications between Blastomeres." By C. **Shearer.** Communicated by Adam Sedgwick, F.R.S.

In cutting sections of a number of segmentation stages of Eupomatus and Polygordius eggs, delicate protoplasmic strands were frequently observed connecting the blastomeres. Experiments with different fixing reagents demonstrated that they were not of the nature of coagulation artifacts, or the result of disintegration of the protoplasm, for in many of the sections in which they were to be seen all the finer details of histological structure were well preserved. Under favourable conditions they could be observed during the living state, and were similar in all respects to the filose strands described by Andrews in a number of Metazoan eggs. They possibly afford a means of coordinating the various cell activities.

PARIS.

Academy of Sciences, April 23.—M. H. Poincaré in the chair.—The president announced the accidental death of M. Curie, and gave a short account of his work.—The eruption of Vesuvius, and in particular, remarks on the explosive phenomena: A. **Lacroix.** A general account of the recent eruption, with particulars of the lava outflows and the nature of the explosions.—A method allowing of the study of the solar corona at other times than during eclipses: G. **Millochau** and M. **Stefanik.** It is proposed to photograph the regions near the sun's edge by means of the spectroheliograph, isolating the line λ 4303 in the second slit, and eliminating the light from other radiations by means of an appropriate green screen. Preliminary attempts have been made at Meudon with encouraging results, and the authors hope to be able to complete the work at the summit of Mt. Blanc.—Algebraic curves of constant torsion: Eugène **Fabry.**—Reducible groups of linear and homogeneous transformations: Henry **Taber.**—The equation of Laplace with two variables: Georges **Lery.**—The use of an electrical tuning-fork as a generator of alternating currents: M. **Devaux-Charbonnel.** Some anomalous results obtained with the currents generated in the electromagnet of an electrical tuning-fork were examined with a Duddell oscillograph. The effects produced